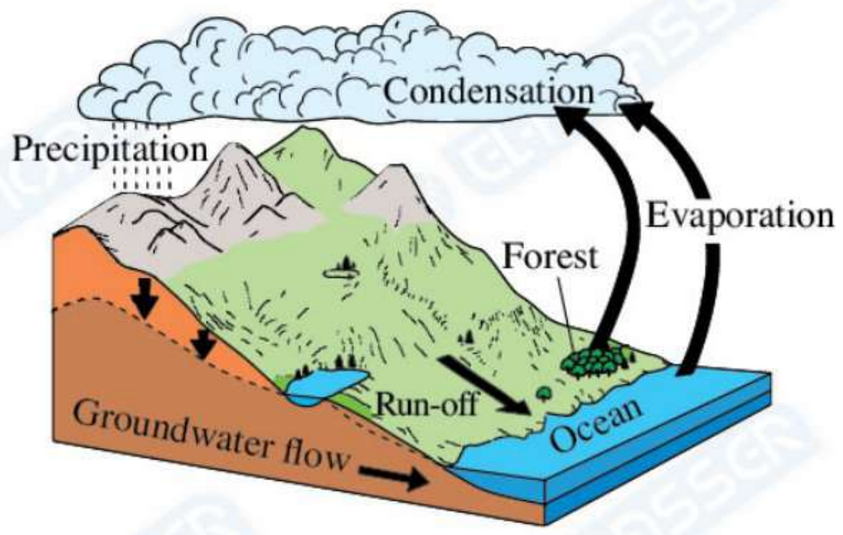
Test 1

Choose the correct answer for the questions (1) : (7) :

1 Which of the following choices expresses the dimensions of a two-dimensional nanosubstance ?

Choices	Length	Width	Height
(a)	1.2×10^{-11} m	200×10^{-10} m	320×10^{-12} m
(b)	21×10^{-10} m	0.18×10^{-5} m	17.9×10^{-9} m
(c)	130×10^{-7} m	49×10^{-7} m	68×10^{-6} m
(d)	17×10^{-8} m	83×10^{-4} m	96×10^{-3} m

2 The opposite figure illustrates the natural water cycle, the occurring processes show an obvious integration between sciences, which are .....



(a) biology, geology and astronomy.

(b) physics, chemistry and geology.

(c) pharmacy, astronomy and chemistry.

(d) agriculture, environment and mathematics.

3 Which of the following expresses the quantitative measurement ?

(a) The burette is longer than the pipette.

(b) HCl is stronger than HCN

(c) Water is a colourless liquid.

(d) The boiling point of ethyl alcohol is 78.37°C

4 The screen of the mobile phone is covered with a nanosubstance to form a thin layer on its surface to protect it from scratching and breaking.
What is the type of this film ?

(a) Colloidal.

(b) One-dimensional.

(c) Suspended.

(d) Two-dimensional.

5 **Which of the following samples has the largest mass ?** [N = 14 , H = 1]

ⓐ 1 mol of N_2H_4 ⓑ 2 mol of N_2

ⓒ 3 mol of NH_3 ⓓ 25 mol of H_2

6 **The following equation is unbalanced :**

$$wPCl_5 + xH_2O \longrightarrow yPOCl_3 + zHCl$$

What are the correct coefficients after balancing ?

Choices	w	x	y	z
ⓐ	1	2	2	4
ⓑ	2	2	2	2
ⓒ	2	2	2	1
ⓓ	1	1	1	2

7 **Which of the following equations represents correctly the reaction of sodium carbonate solution with sulphuric acid ?**

ⓐ $Na_2CO_{3(s)} + H_2SO_{4(aq)} \longrightarrow Na_2SO_{4(s)} + H_2O_{(\ell)} + CO_{2(g)}$

ⓑ $CO^{2-}_{3(aq)} + 2H^{+}_{(aq)} \longrightarrow H_2O_{(\ell)} + CO_{2(g)}$

ⓒ $Na^{+}_{(s)} + CO^{2-}_{3(s)} + H_2SO_{4(aq)} \longrightarrow Na_2SO_{4(aq)} + H_2O_{(\ell)} + CO_{2(g)}$

ⓓ $CO^{2-}_{3(s)} + 2H^{+}_{(aq)} \longrightarrow H_2O_{(aq)} + CO_{2(g)}$

↘ Essay questions :

8 You have a piece of an unknown metal.

How can you estimate the density of this metal ?

State the importance of each of the used tools.

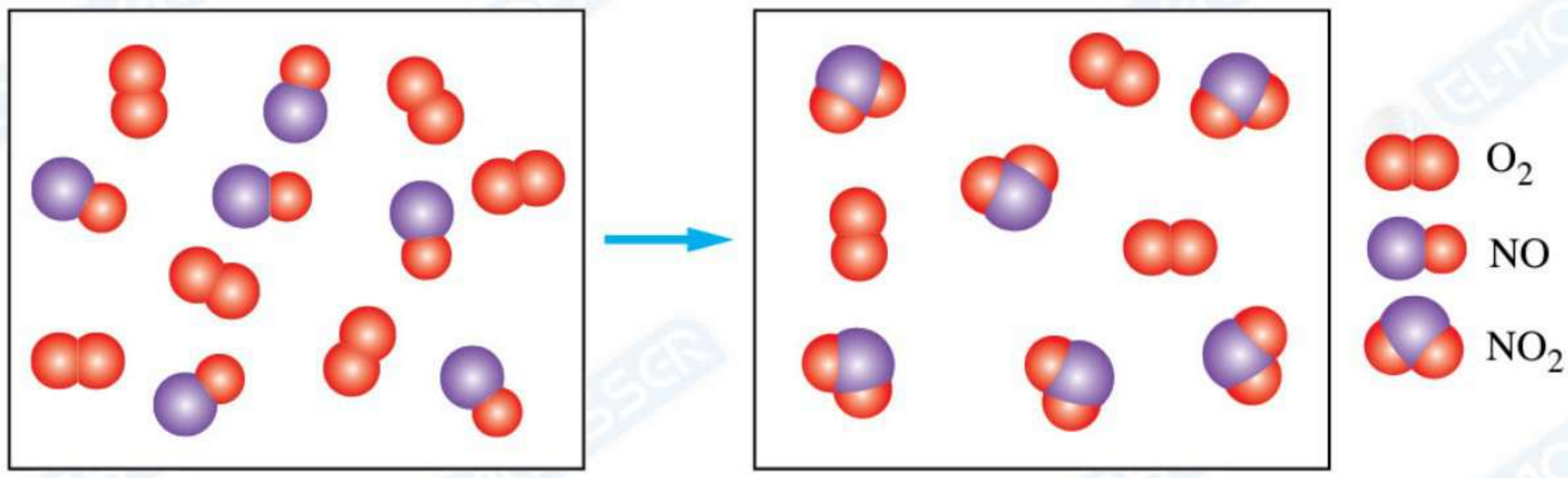
.....

9 The mass of one drop of ethyl alcohol ($C_2H_5OH = 46$ g/mol) is 2.3×10^{-3} g

Calculate the number of the molecules of the alcohol in this one drop.

.....

10 The following figure illustrates the reaction of nitric oxide $NO_{(g)}$ with oxygen $O_{2(g)}$ to form nitrogen dioxide $NO_{2(g)}$:



Write the balanced symbolic equation which represents this reaction, **and determine** the limiting reactant of this reaction.

.....

Test 2

↘ Choose the correct answer for the questions (1) : (7) :

1 **What is the branch of chemistry which is interested in the study of the process of separating a mixture of acetic acid and lactic acid, as well as the estimation of the percentage of each of them in the mixture ?**

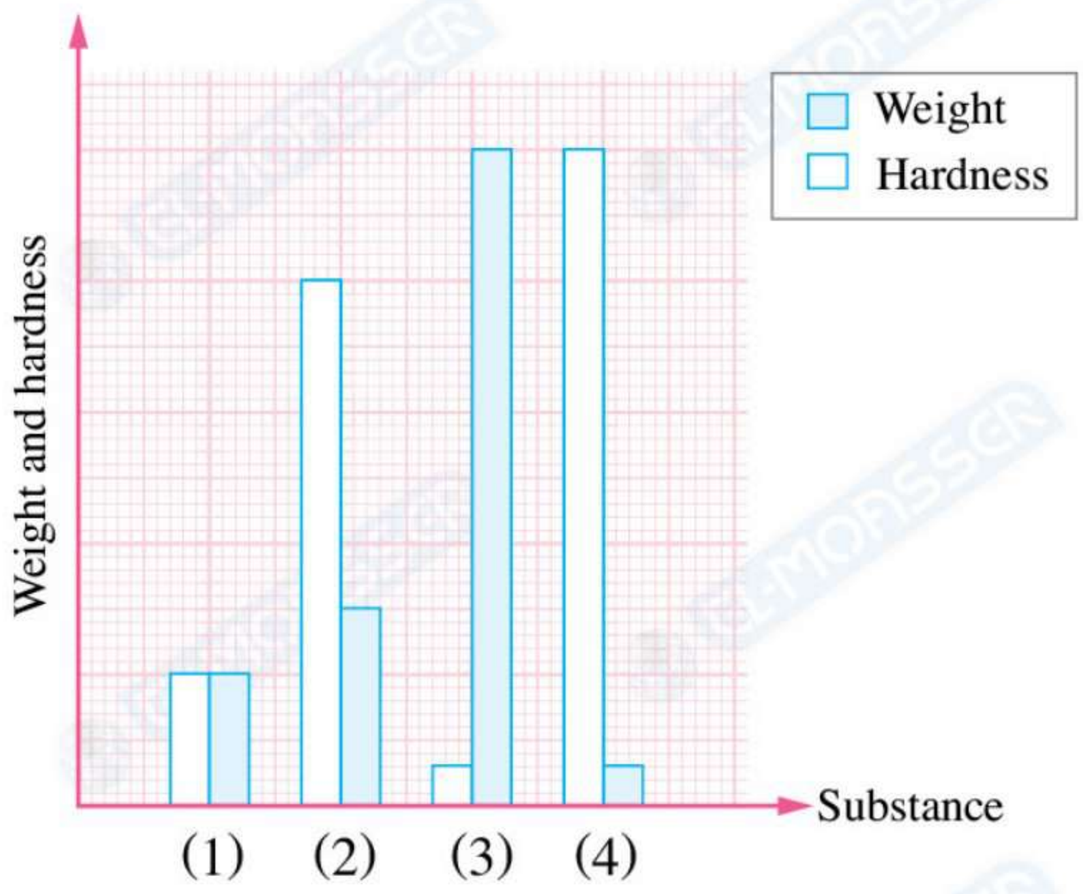
(a) Organic chemistry.
(b) Biochemistry.
(c) Analytical chemistry.
(d) Environmental chemistry.

2 **Which of the following represents the tools required to measure the time of dissolution of 2 g of magnesium in 50 mL of dilute hydrochloric acid ?**

Choices	Stopwatch	Graduated cylinder	Thermometer	Balance
(a)	✓	✓	✗	✗
(b)	✓	✗	✗	✓
(c)	✓	✓	✗	✓
(d)	✗	✓	✓	✓

3 **Which of the substances (1) : (4) in the opposite figure represents carbon nanotubes ?**

(a) (1)
(b) (2)
(c) (3)
(d) (4)



4 **What is the mass of 4 atoms of copper ?** [Cu = 63.5]

(a) 254.2 g
(b) 2.37×10^{21} g
(c) 4.22×10^{22} g
(d) 4.22×10^{-22} g

5 **What is the net ionic equation which represents the precipitation of barium carbonate salt, which is produced from the reaction of barium chloride solution with sodium carbonate solution ?**

(a) $Ba^{2+}_{(aq)} + CO^{2-}_{3(aq)} \longrightarrow BaCO_{3(aq)}$

(b) $Na_2CO_{3(aq)} + BaCl_{2(aq)} \longrightarrow 2Na^{+}_{(aq)} + 2Cl^{-}_{(aq)} + BaCO_{3(s)}$

(c) $Ba^{2+}_{(aq)} + CO^{2-}_{3(aq)} \longrightarrow BaCO_{3(s)}$

(d) $Na_2CO_{3(aq)} + BaCl_{2(aq)} \longrightarrow 2NaCl_{(aq)} + Ba^{2+}_{(s)} + CO^{2-}_{3(s)}$

6 **Substance (A) reacts with substance (B) according to the hypothetical equation :**

$$3A + B \longrightarrow C + D$$

What is the limiting reactant of the reaction of 2 mol of (A) with 1 mol of (B) ?

(a) (A) / As its molar mass is the smallest.

(b) (A) / As all its moles are consumed in producing the least number of products moles.

(c) (B) / As the number of its moles is less than the number of moles of (A).

(d) (B) / As 3 molecules of (A) react with 1 molecule of (B).

7 **Ammonia gas reacts with oxygen gas according to the unbalanced equation :**

$$NH_{3(g)} + O_{2(g)} \longrightarrow NO_{(g)} + H_2O_{(v)}$$

What is the number of oxygen moles required to react completely with 6.8 g of ammonia gas ? [N = 14 , H = 1]

(a) 0.5 mol (b) 1 mol (c) 2.5 mol (d) 5 mol

Essay questions :

8 **Complete the following equation, then write the ionic equation which represents it :**

$$Fe(NO_3)_{2(aq)} + (NH_4)_2CO_{3(aq)} \longrightarrow \ldots\ldots\ldots\ldots + \ldots\ldots\ldots\ldots$$

.....

9 «Science fiction is becoming by time and efforts touchable facts».

Clarify the previous statement in the light of astronomers' expectations regarding the use of carbon nanotubes.

.....

10 **Calculate** the molar mass of bucky ball. [C = 12]

.....

Answers of Test 1

1 (b) 2 (b) 3 (d) 4 (b)

5 (c) 6 (d) 7 (b)

8 * The mass of the metallic piece is estimated by the top loading balance : (m)g

* A suitable amount of water is placed in a graduated cylinder, then the volume of water is estimated : V_1 mL

* The metallic piece is placed carefully in the water which is present in the graduated cylinder, then the new volume is estimated : V_2 mL

* The volume of the metallic piece is calculated from the relation $V = V_2 - V_1$

* By the indication of both the mass of the metallic piece (m) and its volume (V), the density of this metal is calculated from the relation :

$$\text{Density} = \frac{\text{Mass (m)}}{\text{Volume (V)}} \text{ g/mL}$$

9 $$\text{Number of the moles} = \frac{\text{Mass of the substance}}{\text{Molar mass of the substance}}$$

$$\text{No. of alcohol moles in one drop} = \frac{2.3 \times 10^{-3}}{46} = 5 \times 10^{-5} \text{ mol}$$

No. of alcohol molecules in one drop = No. of alcohol moles × Avogadro's number

$$= 5 \times 10^{-5} \times 6.02 \times 10^{23} = 3.01 \times 10^{19} \text{ molecules}$$

10 $2NO_{(g)} + O_{2(g)} \longrightarrow 2NO_{2(g)}$

The limiting reactant of the reaction is nitric oxide gas $NO_{(g)}$

Answers of Test 2

1 (c) 2 (c) 3 (d) 4 (d)

5 (c) 6 (b) 7 (a)

8 $FeCO_{3(s)}$ / $2NH_4NO_{3(aq)}$

The ionic equation : $Fe^{2+}_{(aq)} + CO^{2-}_{3(aq)} \longrightarrow FeCO_{3(s)}$

9 The hardness of carbon nanotubes in addition to its lightness inspired astronomers to think of inventing ropes of high strength which can be used in making space shuttles and elevators.

10 ∵ Bucky ball consists of 60 atoms of carbon.

∴ Molar mass of bucky ball = 60 × 12 = 720 g/mol

Test 1

on the First month

Giza Governorate | Geel 2000 language schools

Choose the correct answer for the questions 1 : 7

1 The value 10 nm equals .....

ⓐ 10^{-8} m ⓑ 10^{-7} m ⓒ 10^{-9} m ⓓ 10^{-10} m

2 In buckyball, What is the number of carbon atoms that each carbon atom is attached to ?

ⓐ 1 ⓑ 2 ⓒ 3 ⓓ 4

3 Which of the following substances has the largest mass ?

ⓐ 1000 mg of gold. ⓑ 1 kg of rice.

ⓒ 10000 g of meat. ⓓ 10000 mg of feather.

4 One of the uses of the three dimensional nano substances is to .....

ⓐ manufacture nanorobots.

ⓑ target the infected cells with the proper medication.

ⓒ target crawling insects.

ⓓ manufacture of geological scanners.

5 In an experiment to measure the change in temperature on adding 25 mL of dilute hydrochloric acid to different volumes of sodium hydroxide solution. Which of the following tools will not be used during this experiment ?

ⓐ

ⓑ

ⓒ

ⓓ

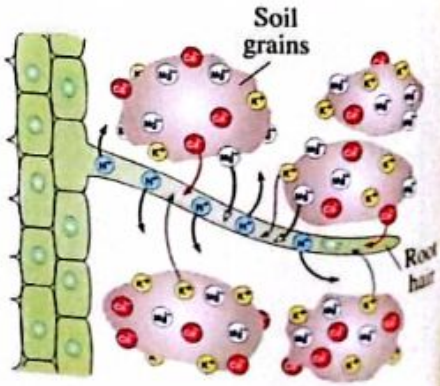
6 The opposite figure represents the movement of ions against the gravity of earth through a root hair of a plant, this represents an integration between chemistry, ...

ⓐ physics and geology.

ⓑ physics and biology.

ⓒ biology and pharmacy.

ⓓ medicine and agriculture.



7 The following equation is unbalanced :

$$S + HNO_3 \longrightarrow H_2SO_4 + NO_2 + H_2O$$

What the coefficient of water after balancing the equation ?

(a) 1 (b) 2

(c) 4 (d) 6

Answer the essay questions 8 : 10

8 The following equation is unbalanced :

$$Sr(NO_3)_{2(aq)} + K_2SO_{4(aq)} \longrightarrow KNO_{3(aq)} + SrSO_{4(s)}$$

Rewrite the previous equation after balancing.

.....

9 **Write the net ionic equation** which represents the previous reaction.

.....

.....

.....

10 **Calculate the number of moles** of carbon dioxide which are produced from the reaction of 69 g of potassium carbonate with excess of nitric acid according to the equation :

$$K_2CO_{3(s)} + 2HNO_{3(aq)} \longrightarrow 2KNO_{3(aq)} + H_2O_{(\ell)} + CO_{2(g)}$$

[K = 39 , C = 12 , O = 16]

.....

.....

.....

.....

.....

Test 2

on the First month

Dakahlia Governorate | Educational directorate

Choose the correct answer for the questions 1 : 7

1 The opposite figure represents the nano volume of particles of 4 substances.

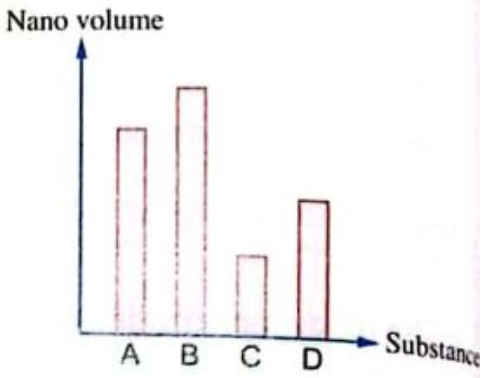
Which of these substances has the least hardness ?

ⓐ A

ⓑ B

ⓒ C

ⓓ D



2 A student wants to measure the volume of hydrochloric acid whose concentration is 0.1 M which is required to be added to 30 mL of sodium hydroxide of unknown concentration to reach the neutralization point.

What is the tool the student has to use ?

ⓐ Pipette.

ⓑ Round-bottom flask.

ⓒ Burette.

ⓓ Volumetric flask.

3 What is the number of atoms in 0.6 g of acetic acid CH_3COOH ? [C = 12, O = 16, H = 1]

ⓐ 60 atoms.

ⓑ 4.8×10^{23} atoms.

ⓒ 2.89×10^{24} atoms.

ⓓ 4.8×10^{22} atoms.

4 What is the number of potassium ions produced by dissolving 100 g of potassium sulphate in water ? [K = 39, O = 16, S = 32]

ⓐ 230 ions.

ⓑ 13.8×10^{23} ions.

ⓒ 115 ions.

ⓓ 6.9×10^{23} ions.

5 Which of the following choices expresses the dimensions of a nano shell ?

Choices	Length	Width	Height
ⓐ	3×10^{-9} m	3×10^{-6} m	1×10^{-3} m
ⓑ	42×10^{-9} m	55×10^{-9} m	87×10^{-9} m
ⓒ	2×10^{-2} m	1 m	1×10^{-6} m
ⓓ	3×10^{-9} m	2×10^{-6} m	1×10^{-9} m

6 What is the coefficients of reactants and products, respectively, in this equation after balancing $FeS_2 + O_2 \longrightarrow SO_2 + Fe_2O_3$?

ⓐ 4, 2, 8, 7 ⓑ 2, 4, 7, 8 ⓒ 2, 11, 7, 8 ⓓ 4, 11, 8, 2

7 (1) Contains 6.02×10^{23} molecules.
(2) Contains 12.04×10^{22} nitrogen atoms.
(3) Contains 3.612×10^{24} hydrogen atoms.
(4) Its mass equal 34 g
Which of the previous information is correct about two moles of ammonia gas ?

[N = 14, H = 1]

ⓐ (1) and (2). ⓑ (3) and (4).
ⓒ (1) and (4). ⓓ (2) and (4).

Answer the essay questions 8 : 10

8 Calculate the mass of sulphate ions produced by dissolving 17.1 g of aluminum sulphate in water. [Molar mass of aluminum sulphate = 342 g/mol, S = 32, O = 16]

.....

.....

9 Give reason : The measurement of pH value has a great degree of importance in chemical and biochemical reactions.

.....

.....

10 Write the net ionic equation of the reaction between sodium carbonate with dilute hydrochloric acid.

.....

.....

.....

Test 3

on the First month

Cairo Governorate | Official language schoo

Choose the correct answer for the questions 1 : 7

1 What is the science which is interested in the separation process and the detection of the components of the substance quantitatively and qualitatively ?

(a) Organic chemistry.
(b) Environmental chemistry.
(c) Physical chemistry.
(d) Analytical chemistry.

2 What is the tool used in preparing potassium hydroxide solution to be used in the determination of the concentration of sulphuric acid ?

(a) Burette.
(b) Round-bottom flask.
(c) Beaker.
(d) Volumetric flask.

3 The volume of nano shell and the thickness of gold layer which covers the shell affect .....

(a) its density.
(b) its odour.
(c) its taste.
(d) its colour.

4 Two nonmetals reacts with aluminum to give aluminum compounds with the chemic formulae AlX and Al_2Y_3, the two nonmetals may be .....

(a) (X) nitrogen, (Y) phosphorus.
(b) (X) sulphur, (Y) oxygen.
(c) (X) phosphorus, (Y) sulphur.
(d) (X) oxygen, (Y) nitrogen.

5 What is the coefficient of sulphuric acid in this equation after balancing ?

$$Mg_3N_2 + H_2SO_4 \longrightarrow MgSO_4 + (NH_4)_2SO_4$$

(a) 1
(b) 4
(c) 2
(d) 3

6 Which of the following salts can give an aqueous solution ?

(a) $CaCO_3$
(b) $BaSO_4$
(c) AgCl
(d) $Pb(NO_3)_2$

7 Which of the following equations represents the net ionic equation of the reaction between barium chloride solution and magnesium sulphate ?

(a) $Mg^{2+} + SO_4^{2-} \longrightarrow MgSO_4$
(b) $Ba^{2+} + 2Cl^- \longrightarrow BaCl_2$
(c) $Ba^{2+} + SO_4^{2-} \longrightarrow BaSO_4$
(d) $Mg^{2+} + 2Cl^- \longrightarrow MgCl_2$

Answer the essay questions 8 : 10

8 **Calculate the mass of** calcium oxide produced from the thermal decomposition of 0.1 mole of calcium carbonate. [Ca = 40 , C = 12 , O = 16]

.....

.....

9 **Calculate the total number of** moles of the ions found in 426 g of aluminum nitrate. [Al = 27 , N = 14 , O = 16]

.....

.....

10 **Calculate the number of moles of** the substance produced from burning 12 g of magnesium in excess amount of oxygen. [Mg = 12]

.....

.....

.....

Unit 1 Chapter 1

❖ *Write the scientific term:*

a. The science which is interested in studying the chemical structure of the parts of the cell.

(……..)

b. The science that is interested in studying the properties and structure of matter

(……..)

c. Chemical compounds that have healing properties.

(……..)

d. A flask used in titration.

(……..)

e. A glass tube with two opening used to measure and transport a certain volume of liquids.

(……..)

f. A flask used to prepare solution with very accurate known concentration

(……..)

g. A digital apparatus used to measure PH value.

(……..)

❖ Choose the correct answer:

1. The PH value of a basic solution is……

   a) > 7 b) < 7 c)=7 d)=14

2. Most of tools in the chemistry laboratory are graduated from the lower to the upper except……

   a) flasks b) graduated cylinders

   c) burette d) graduated beakers

3. Physical chemistry is the science that specialized in studying…….

   a) structure and properties of matter b) the nature of hormone

   c) ratios of the soil components d) all the previous

❖ Give reason:

1-PH meter is more accurate than PH test paper tape.

……

2-The presence of a pipette supported with a sucking tool in the chemistry lab.

……

❖ Correct the underlined word

✓ Conical flask is used to prepare solution of accurately known concentration.

……..

❖ *Mention one use of:*

A. Measurement

……

B. Digital balance

……

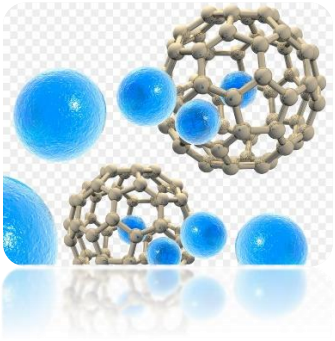
C. Beakers

……

D. Physical chemistry

……

Unit 1 Chapter 2



❖ *Write the scientific term:*

a) The science which is interested in studying the chemical structure of the parts of the cell.

(……..)

b) Substances have two dimensions less than 100 nm.

(……..)

c) The measuring unit that equals one part per billion from the meter.

(……..)

❖ *Choose the correct answer:*

1- The reason of the new unique properties of the nano substances is the very large ratio between ..... and volume.

a) surface area b) density c) mass d) length

2- All the following are one-dimensional Nano substances except……

a) Thin films b) nano wires c) nano fibers d) nano shell

3- Nnaometer equals …… meter.

a)1×10^{9} b)1×10 c)1×10^{-3} d)1×10^{-9}

4- .....is used as a carrier for medicine.

a) Nano robots b) Nano silicon c) Bucky ball d) carbon nano tube

❖ *Give reason for:*

- The bucky ball is denoted by C60.

  (……..)

- Solar cells using Nano silicon is better than normal solar cells.

  (……..)

- The effectiveness of using bucky ball as carrier for medicine.

  (……..)

❖ *Define:*

* Critical nano volume
(……..)

❖ *Give one use:*

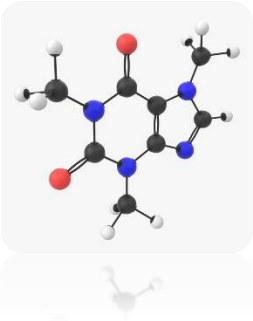
- Nanotechnology in agriculture field.
  (……..)

❖ *Compare:*

- ✓ One, two, three dimensional substances according to (definition, example, uses)

Unit 2 Chapter 1

Part 1



❖ Write the scientific term:

1) A group of chemical symbols and formula of the reactants and products (……..)

2) The chemical equation in which some or all reactants and products are written in the form of ions (…)

3) The reaction of an acid and base to form salt and water(…)

4) The smallest part of a substance that can be found in a single form and the properties of matter depends on it (…)

❖ Choose the correct answer:

1) The symbol (s) is written down the right of the chemical formula of which of the following: ……

a)NaCl b)H2O c)CO2 d)H2SO4

2) The chemical equation describes……

a)products b)reactants c)reaction condition d)all the previous

3) reaction can be represented by the following ionic equation

$H^+ + OH^- \longrightarrow H_2O$

a)precipitation b)direct combination

c)neutralization d)dissolving

4) The chemical equation should be balanced to achieve the law of……

a) Avogadro b)energy conservation c)mass conservation d)fixed ratios

❖ Give reason for:

1-The chemical equation should be balanced

……

❖ Express the following in the form of ionic equation:

1-Reaction between nitric acid and potassium hydroxide

……

……

……

2-Reaction between sodium chloride and silver nitrate

……

……

……

❖ Rewrite the following equations after balancing them:

1) $H_2S + SO_2 \longrightarrow S + H_2O$

……

2) $Mg_3N_2 + H_2O \longrightarrow Mg(OH)_2 + NH_3$

……

❖ Express the following in the form of equation:

1-Reaction between sulphuric acid and zinc.

……

2-Magnesium and copper sulphate.

……

3-Reaction between sodium hydroxide and nitric acid.

……

Chapter 1

Part 2

❖ Write the scientific term:

1-The sum of masses of atoms in one molecule of an element or a compound.

(…….)

❖ Choose the correct answer:

1-The molar mass of potassium sulphate is..... g [K=39, S=32, O=16]

a)147 b)135 c)130 d)150

2-The molar mass of sulphur in its vapor state

is…….a.m.u [S=32]

a)32 b)64 c)256 d)265

3-The mass of 0.1 mol of sodium hydroxide equals.. g[Na = 23,O=16 , H=1]

a)0.04 b)0.4 c)4 d)40

❖ Problems:

1-Calculate the number of moles of calcium in 40 g of calcium [Ca=40]

……

……

2-What is the mass of 0.2 mole of water [H =1 , O = 16]

……

……

……

3-find the mass of 5 mole of potassium carbonate.

[k=39,C=12,O=16,H=1]

……

……..

4-Balance the following equation:

$Na + H_2O \longrightarrow NaOH + H_2$ [Na = 23, O = 16, H=1]

Then calculate the mass of sodium hydroxide which is produced from the reaction between 1 mol sodium with water.

……

……

5-Find the mass of calcium oxide produced from the thermal ecomposition of 50 g of calcium carbonate [Ca = 40 , C = 12, O = 16]

……

……

……

6-Find the number of moles of hydrogen gas needed to produce 0.18 g of water

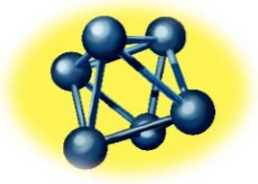
……

……

……

Chapter 1

Part3



❖ Write the scientific term:

1- The number of atoms, molecules or ions which are found in one mole of the substance.
(……..)

2- Equal volume of different gases at constant temperature and pressure contain equal number of molecules.
(……..)

3- The reactant which is completely consumed in the reaction.
(……..……)

4-The quantity of substance that contain Avogadro number of particles.
(……..)

❖ Choose the correct answer:

1- The mole of ammonia gas NH3 contains…….
a)3 mol of hydrogen molecules b)3 mol of hydrogen atoms
c)3 mol of hydrogen ions d)1 mol of nitrogen molecules

2-The mass of 3.0 × 1023 atoms of sodium is ……g [Na = 23]
a)0.5 b)11.5 c)23 d)45

3- When 1 mol of sodium chloride is dissolved in water, the total number of ions

equals……

a) Avogadro's number b) 2 × Avogadro's number

c)3 × Avogadro's number d) 4 × Avogadro's number

4-The mass of 44.8 L of ammonia gas at STP is g [N = 14, H=1]

a)2 b)17 c)0.5 d)34

❖ Give reason for:

1-The equal masses of different element don't contain the same number of atoms

……

2-One liter of any gas contains the same number of molecules at STP.

……

❖ Problems:

1-Calculate the number of atoms in 0.5 mole of sodium. [Na = 23]

……

……

2-In the following equation

$4Al + 3\ O_2 \longrightarrow 2Al_2O_3$

a) Find the number of Oxygen atoms needed to react with 5.4 g of aluminum

……

……

b) Mass of oxygen needed to react with 0.6 mol of aluminum.

……

……

……

3-Find the volume of 3.01 × 1023 molecules of CO2 gas at STP.

[C=12, O=16]

……

……

……

4- Calculate the required volume of oxygen gas to produce 90 g of water, when it reacts with an excess amount of hydrogen gas at STP [H =1, O=16]

……

……

5- Calculate the volume of CO2 gas which is produced from the thermal decomposition of CaCO3 sample its mass equals 150 g according to the following equation [Ca =40, C = 12 , O =16]

CaCO3 $\longrightarrow$ CaO + CO2

……

……

……

6-Arrange the following values ascending according to the volume at STP

a)22.4 L of N_2 b)3.2 g of O_2

c)0.9 mol of NO_2 d)3.01 × 10^{23} molecules of CO [O = 16, N=14, C=12]

……

……

……

7-Calculate the number of carbon atoms found in 50 g of calcium carbonate. [Ca=40 , C =12, O=16]

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8-Calculate the mass of calcium carbonate needed to produce 11.2 liter of carbon dioxide according to the following equation

$CaCO_3 + 2HCl \longrightarrow CaCl_2 + CO_2 + H_2O$

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